A Method

For finding the Number *of the* Julian Period *for any Year aſſign'd, the* Number *of the* Cycle *of the* Sun, *the* Cycle *of the* Moon, *and of the* Indictions *for the ſame year, being given; together with the* Demonſtration *of that Method.*

IN theſe *Tranſactions*, *N°* 18. *p.* 324. is a *Theorem* for finding the Year of the *Julian Period* by a new and very eaſie Method, which was taken out of the *Journal des Scavans*, *N°* 36. as it had been propoſed and communicated by the Learned Jeſuit *De Bill.*

Multiply the $\left\{\begin{array}{l}\left.\begin{array}{l}\textit{Solar}\\ \textit{Lunar}\end{array}\right\}\textit{Cycle}\\ \textit{Indiction.}\end{array}\right\}$ by $\left\{\begin{array}{l}4845.\\ 4200.\\ 6916.\end{array}\right\}$ Then divide the ſum of the Products by 7980 (the *Julian Period*) the Remainder of the Diviſion, without having regard to the Quotient, ſhall be the Year inquired after.

Some Learned Mathematicians of *Paris*, to whom the ſaid *P. de Billy* did propoſe this Problem, have found the Demonſtration thereof as the ſame *Journal* intimates.

There being no further Elucidation of the ſaid *Theorem* ſince publiſh'd, Mr. *John Collins*, now a Member of the *Royal Society*, communicated what follows, *viz.*

That the *Julian Period* is a Baſis, whereon to found *Chronology* not liable to Controverſie, as the Age of the *World* is: And 'tis the Number aboveſaid, to wit, 7980, which is the Product of $\left\{\begin{array}{l}28\\ 19\\ 15\end{array}\right\}$ the $\left\{\begin{array}{l}\left.\begin{array}{l}\textit{Solar}\\ \textit{Lunar}\end{array}\right\}\textit{Cycle.}\\ \textit{Indiction.}\end{array}\right.$

Concerning this *Julian Period,* the late Archbiſhop of *Armagh*, *Uſher*, in the Preface to his Learned Annals, advertiſeth, that *Robert Lotharing*, Biſhop of *Hereford*, firſt obſerved the Conveniencies thereof; 500 years after whom, it was fitted for Chronological uſes by *Joſeph Scaliger*, and is now embraced by the Learned as ſuch a limit to *Chronology*, that within the ſpace of 7980 Years, the *Number* of the *Sun's Cycle*, the *Prime*, and the year of the *Roman Indiction* (which relates to their ancient Laws

and

and Records) can never happen alike. And theſe Remarques being given, the year of the *Julian Period* is by the former Rule infallibly found.

This *Period* is uſed by the ſaid Archbiſhop in his *Annals*, and is by him accounted to exceed the Age of the *World* 709 years. Thoſe that deſire further ſatisfaction about *Æra's*, *Epocha's*, and *Periods*, may repair to many Authors, and among them to *Gregory's Poſthuma* in Engliſh, *Helvici Chronologia*, *Ægidii Strauchii Breviarium Chronologicum*, who is one of the lateſt Authors.

Now as to the *Problem* it ſelf, it may be thus propoſed:

Any number of Diviſors, together with their Remainders after Diviſion, being propoſed, to find the Dividend.

This thus generally propoſed is no *new* Problem, and was reſolved long ſince, by *John Geyſius*, by the help of particular Multipliers, ſuch as thoſe above-mentioned, and publiſh'd by *Alſtedius* in his *Encylopædia* in *Ann.* 1630. and by *Van Schooten* in his *Miſcellanies.*

We ſhall clear up, what Authors have omitted concerning the *Definition* and *Demonſtration* of ſuch fixed Multipliers, *&c.* And therefore ſay, that each Multiplier is relative to the Diviſor, to which it belongs, and thus define it;

It is ſuch a Number, as divided by the reſt of the Diviſors, or their Product, the Remainder is 0; *but divided by its own Diviſor, the Remainder is an* Unit.

We require the Diviſors propoſed to be *Primitive* each to other, *i. e.* that no two or more of them can be reduced to leſſer terms by any common Diviſor: For if ſo, the Queſtion may be *poſſible* in it ſelf, but not reſolvable by help of ſuch Multipliers, ſuch being impoſſible to be found. The reaſon is, becauſe the Product of an Odd and Even Number is always Even, and that divided by an Even Number, leaves either Nothing, or an Even Number.

Diviſors	The Multipliers relative thereto are
28	4845
19	4200
15	6916

The *Definition* affords light enough for the diſcovery of theſe Numbers. To inſtance in the *firſt*: The Product of 19 and 15

is

is 285,which multiply by all numbers ſucceſſively,and divide by 28,till you find the Remainder required. Thus twice 285 is 570, which divided by 28,the remainder is 10; alſo thrice 285 is 855, which divided by 28, the remainder is 15. Thus if you try on ſucceſſively, you'l find, that 17 times 285, which is 4845, is the Number required, the which divided by 28, the Remainder is an *Unit*. Hence then we ſhall find, that

4845	is equal to the Solid or Product of	19, 15, 17.
4200		28, 15, 10.
6916		28, 19, 13.

More eaſie ways of performing this *poſtulatum*, are to be found in *Van Schooten*'s *Miſcellanies*, and *Tacquet*'s *Arithmetick*, which perchance are not ſo obvious to every underſtanding.

For illuſtration of the *Rule* propoſed, take this Example.

In the year 1668.	*Cyclus Solis*	25	The Multipliers.	4845	Products.	121125
	Cyclus Lunæ	16		4200		67200
	Indictio	6		6916		41496
					The Sum of the Products	229821

The which divided by 7980, the remainder is 6381, for the year of the *Julian Period*; from which ſubtracting 709,there remains 5672, for the Age of the World, according to Archbiſhop *Uſher*.

For DEMONSTRATION of this *Rule* we thus argue:

1. *Each Multiplier multiplied by its Remainder, is meaſured or divided by its own Diviſor, leaving ſuch a Remainder as is propoſed.*

For before, each Multiplier was defined to be a *Multiplex* of its own Diviſor, *plus* an *Unit:* Wherefore multiplying it by any Remainder, it doth only render it a greater *Multiplex* in the ſaid Diviſor, *plus* an *Unit*, multiplied by the Remainder, which is no other than the Remainder it ſelf; but if 0 remain, that Product is deſtroyed.

2. *The Sum of the Products, divided by each reſpective Diviſor, have the Remainder aſſigned.*

For concerning the firſt Product, it is by the firſt *Section* meaſur'd by its own Diviſor, leaving the remainder propoſed; and if we add the reſt of the Products thereto, we only add a *Multiplex* of its own Diviſor, which in Diviſion enlargeth the *Quote*, but not the *Remainder*.

Particularly the ſecond Multiplier is 28 + 15 + 10 + Remainder, all which is but a *Multiplex* of 28.

And ſo the third Product is 28 + 19 + 13 + Remainder.

And what hath been ſaid concerning the ſum of the Products, being divided by the firſt Diviſor, and leaving the Remainder thereto aſſign'd, may be ſaid of each reſpectively.

3 *The ſum of the Products divided by the ſolid of the three Diviſors, leaves a Remainder ſo qualified as the ſaid Sum.*

For concerning the ſaid Sum, 'tis evident by the *ſecond* hereof, that it is no other than the firſt Product; increas'd by *adding* a juſt *Multiplex* of the firſt Diviſor, that thereby we did only *enlarge* the *Quote*, not *alter* the *Remainder*. By the like reaſon, the *ſubtracting* a juſt *Multiplex* thereof, doth only *alter* the *Quote*, not the *Remainder*; but the Solid of all three Diviſors, multiplied *here* by the *Quote*, as *there* by the *Remainder*, is no other than a juſt *Multiplex* of the firſt Diviſor. Wherefore the Remainder, after this Diviſion is perform'd, is of the ſame Quality as the ſum of the Products, and divided by the firſt Diviſor, leaves the Remainder proper thereto. And the like may be ſaid concerning each Diviſor.

AS in the Method hitherto deliver'd, we requir'd the Diviſors be *Primitive* to each other; ſo, if we take the *Problem* as generally propoſed, in the Preface to *Helvicus* his *Chronologia*, we are told, common Arithmetick fails in the ſolution thereof, and *Tacquet* denies it to be performable by the *Regula Falſi*, and being unlimited, we muſt do it by Tryals. Wherefore,

When any two Diviſors with their Remainders are propoſed, try the Multiplices of one of them, increaſed by its Remainder, and divide by the other: If you find ſuch Remainders as are not for the purpoſe, and that they are repeated, the Problem is impoſſible.

	Diviſors	Remainders
Example.	6.	3.
	8.	5.

The Multiplices of 8, increaſed by 5, are . .	13. 21. 29. 37. 45. 53.
Thoſe divided by 6, the Remainders are . .	1. 3. 5. 1. 3. 5.

Here you ſee 21 and 45 for the purpoſe, and take the Progreſſion, adding the common Difference 24 (which is the leaſt Dividend meaſured by 6 and 8) and you have 21. 45. *69*. *93*. 117. 141.

Admit, the Queſtion had concerned theſe three Diviſors:

Diviſors		Remainders
6	the Remainders being	3
8		5
9		*6*

Then dividing the former Progreſſion by 9, the Remainders are 3. 0. *6*. 3. 0 *6*.

Wherefore I conclude, that the third and ſixth of theſe Numbers are thoſe ſought, to wit, *69* or 141, and ſo on progreſſively; whereas, if you had propounded the Remainder of 9 to have been any other Number than 3, 0, *6*, the *Problem*, as concerning all theſe, had not been poſſible.

Some eaſie Caſes of the Problem are theſe:

When the Remainder of ſome Diviſor is 0, and of each of the reſt of the Diviſors, an *Unit*, or leſs by an *Unit*, than the Diviſor.

In which Caſes you are to find ſuch a *Multiplex* of the Product or leaſt Dividend meaſurable by thoſe Diviſors that have Remainders, which increas'd or diminiſh'd by an *Unit*, may be a juſt *Multiplex* of that Diviſor that hath no Remainder. Theſe Caſes are handled by *Tacquet*, and *Bachet* in his *Problemes plaiſans & delectables*.

PROBLEM.

To find the Year of the Julian Period for any year of our Lord propoſed.

It is neceſſary to be furniſhed with the *Sun's Cycle*, the *Prime Number*, and the Number of the *Roman Indiction*, which the induſtrious Mr. *Street* thus performs:

when 1. 9. 3. *to the Year hath added been,*
Divide by 19. 28, *ſifteen.*

The Remainders are the Numbers ſought. And hereby we found them for the year 1668. in the former Example

The uſe of the *Prime* is, to find the *Epact*, and thereby the *Moons Age*, time of *High Water*, &c.

A farther uſe of the *Suns Cycle* is, to attain the *Dominical Letter*, and thereby to know the *Day* of the *Week*, on which any Day of the Month happens. But this is more eaſily and with leſs caution obtain'd, by finding on what Day of the Week the firſt of *March* happens for ever, according to ſuch *Rules* and *Verſes* as I have elſewhere publiſhed. In brief thus:

To the Number . . . . 2.
Add the Year of our Lord, ſuppoſe 1669.
And its even 4*th* part, neglecting what remains, if any . . } 417.

The Sum . . . . . . 2088. Divide by 7, noting the Remainder, which ſhews the Number of the Day of the Week, accounting *Sunday* firſt. If 0 remain, the *firſt* of *March* falls on a *Saturday*. In this Example there remains 2, ſhewing the *firſt* of *March* to fall on *Monday*.

If it were required to perform this for years *preceding* our *Saviour's Nativity*, then take this *Rule*:

To the Year add its even fourth part, the Sum divide by 7, the Remainder ſhews the Day of the Week, accounting *Sunday* firſt, *Saturday* ſecond, and ſo backward.

PROBLEM.

To find what day of the Month in the firſt week of each Month, happens to be on the ſame day of the week as the firſt of March.

Uſe the (plain) following *Verſes*, in which the twelve Words relate to the twelve Months of the Year; accounting *March* the firſt:

Ask endleſs Comfort, God enough beſtows,
From Divine Axioms Faith confirmed grows.

The Alphabetical Number of the firſt Letter of the word, proper to the Month propoſed, is the Anſwer.

Example.

If the Month were *April,* the word proper thereto is *Endleſs*, and *E* is the fifth Letter in the Alphabet. Wherefore conclude, That the firſt of *March* and *fifth* of *April* do for ever happen on the ſame day of the Week; which for the year 1669. will be on *Monday.*

PROBLEM.

To find on what day of the Week the firſt day of each Month happeneth.

Suppoſing the firſt of *March* known, it might be reckoned from the former *Problem*, but the following *Verſe*, beginning with *March*, as the former, is more ready for the purpoſe:

A dreadful Fire, Beholders daily Gaze,
Chaſtized England. *Ah cruel fatal Blaze.*

Explication.

In the Year 1669, the *firſt* of *March* is *Monday*; I would know on what *day* of the *week* the *firſt* of *October* happens. The word proper to the Month is *England*; then count Alphabetically to *E*, *viz. A.* Monday, *B.* Tueſday, *C.* Wedneſday, *D.* Thurſday, *E.* Friday, which is the day ſought. Whence conclude, that the 1*st*, 8*th*, 15*th*, 22*th*, 29*th* days of *October* are all *Fridays.* Thence it is eaſie to reckon, on what day of the Week any day of that Month happened; and ſo for all other Months.

PROBLEM.

To find on what Day of the Month the Sun enters into any Sign of the Zodiack.

For this, *ex ſuper abundanti*, we give the following Verſe:

Charles *brought Content, divers Effects enſue,*
Envy, Fear, Dolour, Danger, bids adieu.

Here again the twelve Words relate to the twelve Months, *March* being the firſt.

To the number of the Letter of the *Alphabet* the word begins with, add 7.

Example. *Fear* is the word for *October*, and *F* the ſixth Letter: Wherefore the Sun enters into the 8*th* Sign, to wit, *Scorpio*, on the 13*th* of *October*.

An Account of ſome Books.

I. PETRI LAMBECII LIB. PRIMUS PRODROMI *HISTORIÆ LITERARIÆ*, &c. ——

THe Author of this Book is now the *Hiſtoriographer* and *Library-keeper* to the Emperour. He publiſh'd this Volume ſome few years ago at *Hamburgh*, the place of his Birth, (whence an Exemplar was but lately ſent to the *Publiſher.*) He was excited to this Work by the complaint made by the illuſtrious Lord *Verulam*, (*Lib. 2. cap. 4. de Augm. Scientiarum*) of the want of a compleat *Hiſtory* of *Learning*, that might give a *ſatisfactory* Account of the Riſe, Progreſs, Tranſmigrations, Interruptions, Declinations, and Reſtaurations of all kind of Learning, Sciences, Arts, and Inventions; together with the *occaſion* of Inventions through *all* Arts; the *method* of teaching, and the *manner* of improving and advancing them: Adding the various *Sects*, and the moſt famous *Controverſies* among the Learned; the *Encouragements* they received; the chief *Writings* they compoſed; their *Schools*, *Academies*, *Societies*, *Colledges*, *Succeſſions*, *Orders*, and whatever belongs to the *ſtate* of Learning.

This grand *Deſideratum* our Author undertakes to ſupply the World with, and in order thereunto, hath given us the *firſt Book* of the *Prodromus* of this Hiſtory, and with it the *four firſt Chapters* of the *Second Book*, together with an *Appendix*, containing a *Summary* of the chief *Perſons* and *Things* he intends more fully and accurately to treat of in the remaining 32 Chapters, deſigned for the ſame *ſecond Book*: To which, he ſubjoins two Tables of *Univerſal Chronography*, in the firſt whereof he exhibits the ſucceſſion of all Ages from the Creation of the World to the beginning of the common *Chriſtian* Account; in the *other*, a Continuation of them from the beginning of the ſaid Account unto this preſent Age: In which *Tables* he gives a general *Idea* of the Connexion of all Ages, as they are computed in reſpect of the